

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 71469/312818	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2004/036498	International filing date (<i>day/month/year</i>) 03 November 2004 (03.11.2004)	Priority date (<i>day/month/year</i>) 17 December 2003 (17.12.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant TOKYO ELECTRON LIMITED		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input checked="" type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Date of issuance of this report 20 June 2006 (20.06.2006)
Facsimile No. +41 22 740 14 35	Authorized officer <div style="text-align: center; font-weight: bold; font-size: 1.2em;">Philippe Becamel</div>
Telephone No. +41 22 338 70 90	

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

REC'D 27 APR 2005

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To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2004/036498

International filing date (day/month/year)
03.11.2004

Priority date (day/month/year)
17.12.2003

International Patent Classification (IPC) or both national classification and IPC
H01L21/00, C23C16/44

Applicant
TOKYO ELECTRON LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1 (a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized Officer

Paisdor, B

Telephone No. +49 89 2399-5953



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/036498

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/036498

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-53
Inventive step (IS)	Yes: Claims	
	No: Claims	1-53
Industrial applicability (IA)	Yes: Claims	1-53
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43bis.1 and 70.10)

and / or

2. Non-written disclosures (Rules 43bis.1 and 70.9)

see form 210

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V.

- 1 Reference is made to the following documents:
D1: WO 03/021642 A (APPLIED MATERIALS, INC) 13 March 2003 (2003-03-13)
D2: WO 02/04887 A (SEMITOOL, INC; RITZDORF, THOMAS, L; EUDY, STEVE, L;
WILSON, GREGORY, J) 17 January 2002 (2002-01-17)
- 2 INDEPENDENT CLAIMS 1 and 40
 - 2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent method claim 1 and the corresponding independent product 40 is not new in the sense of Article 33(2) PCT.
 - 2.2 Claim 1 of the present application pertains to a method of processing a substrate by chemical oxide removal which comprises the determination of a desired state for at least one "target critical dimension" for the substrate (i.e. determining desired output state) , receiving pre-process metrology data for the substrate (input state), determining process recipe, processing the substrate using the determined recipe by "chemically altering" surface layers on the substrate and finally thermally treating the substrates surface layers.
 - 2.2.1 Document D1 discloses (the references in parentheses applying to this document) a method and apparatus for processing a wafer featuring *inter alia* the same technical features of the presently claimed method (cf. Figs. 2-4, 7, and in particular 8A-8B). The method and apparatus of D1 also includes an etch module (cf. 900, Fig. 9), an etch/strip tool 600 or a clean tool 1200 to remove oxide on a silicon substrate (cf. p. 58, par. 158). According to par. 64 - 78 (pages 21-25) the apparatus includes an optical CD tool within the metrology tool (700) which is used to determine critical target dimensions; a library of reference CDs is built (cf. par. 67). In step 840 of Fig. 8A pre-process metrology data are received (input value), in step 870 they are compared with the desired output value and, consequently, a process recipe is determined (cf. Fig. 8A, step 880). Subsequently, the substrate is processed according to the

determined process recipe and is then "chemically altered" (i.e. etched in etcher 900, Fig. 8A); further reference is made to Fig. 8B. Finally a thermal treatment of the chemically altered substrate surface is carried out in the thermal process tool (1300, cf. Fig. 13A).

These references in D1 show that the technical features of the device corresponding to the process of claim 1 according to independent product claim 40 is also disclosed in D1, because a COR module, a PHT module, an IMM module, a control device and also an isolation assembly coupled between PHT and COR module are present in the apparatus of D1 (cf. Fig. 12).

- 2.2.2 Also in document D2 the technical features of method claim 1 and product claim 40 are disclosed; to clarify this, it is particularly referred to page 5, lines 12-15, 22-24, and 28-31, and page 6, lines 1-12. Furthermore, in Fig. 8 the major steps of claim 1 of the present application [etch (i.e. chemically altering), anneal (i.e. thermal treatment), pre-metrology to determine input state, compare input with desired output state] are summarized. The determination of the process recipe is mentioned on page 5.

3 DEPENDENT CLAIMS 2-39, 41-53

Dependent claims 2-39, 41-53 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).

Re Item VI.

Certain documents cited

Certain published documents

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
WO2004/084280	30/09/2004	16/03/2004	17/03/2003

The content of this document (D3) could be relevant for the assessment of novelty of the independent claims 1 and 40 of the present application, because D3 discloses a method and apparatus for processing a substrate by COR which comprises all technical process and product features falling under the ambit of claims 1 and 40 of the present application. Reference is made to paragraphs 32-36, 47, 54, and 77-81; particular attention is drawn to paragraph 54 describing the determination of the process recipe.

Re Item VIII.

1. The application does not meet the requirements of Article 6 PCT, because claims 1, 8, 10-13, 22-30, 32, and 40-42 are not clear.
2. The relative terms "approximately" and "substantially" used in claims 8, 10-13, 22-30, 32, 41 and 42 have no well-recognised meaning and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT.
3. The vague and imprecise statement in the description on page 57 (cf. par. 238) "...scope of the invention..." implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them.
4. The wording "incorporated by reference" (see page 1, first and second paragraph) is usually deleted from an application as it renders the scope of the description unclear (Article 6 PCT). If matter in the document referred to is essential to satisfy the requirements of Article 5 PCT, at least a summary thereof should be incorporated into the description (Guidelines C-II, 4.17). With respect to the current practice the wording "incorporated by reference" should be deleted.
5. Independent claims 1 and 40 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (for instance D1, D2, D3) being placed in the preamble (Rule 6.3(b)(I) PCT) and with the remaining features being included in the

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/US2004/036498

characterising part (Rule 6.3(b)(ii) PCT).